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BOVIDÆ FROM THE ASIATIC EXPEDITIONS¹

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The Bovidæ of Mongolia and China offer some interesting contrasts. In the open Gobi Desert, two genera of gazelles occur, apparently as invaders of this region from the high plateaus of Tibet and the country to the southwest, while in the mountainous parts of Mongolia are found the ibex and the argali, the latter no doubt having formerly had a much more extensive range to the eastward, since it still occurs north of Peking and is known from Shantung as a subfossil. The ibex, however, seems to find its eastward limit in the mountains of the central Gobi, and has its general area of distribution to the southwest. In contrast to these species of open, arid country are the serows, gorals, and takins of the wooded cliffs and mountain thickets of China, species more characteristic of southeastern Asia. In the course of several years' work, the Asiatic Expeditions, under the leadership of Dr. Roy Chapman Andrews, have amassed a magnificent series of skins and skulls representing nearly 175 specimens of this group, a brief report on which is here given.

Ovis ammon darvini Przewalski

Ovis darvini PRZEWALSKI, 1884, 'Reise in Tibet,' p. 268, Fig.

The discrimination of the local races of argali is still in a far from satisfactory state, nor can it be said that the elaborate monograph (in Russian) by Nasonov (1923) has altogether cleared the matter. Although Pousargues (1898) recognizes no subspecies of this sheep, later authors seem agreed that the argali of Mongolia and North China differs racially from typical *Ovis ammon* Linné (type-locality, upper Irtisch River, Siberian Altai). Lydekker, in his key (1913), gives as the chief distinguishing character the less-developed horns of the Mongolian argali, ranging from 41 to 50.5 inches in length of curve, while in typical *ammon* they form more than a complete circle, and attain a length of from 59 to 62 inches. Howell (1929) believes that the eastern race may be distinguished by the dingy rather than pure-white rump patch.

¹Publications of the Asiatic Expeditions of The American Museum of Natural History. 'Contribution No. 99.

Various technical names have been applied to this eastern race. Severtzov, in 1873, called it *Ovis argali mongolica*, while Peters three years later, unaware of this author's work, renamed it *Ovis jubata*, type-locality the eastern part of Mongolia north of Peking. Both of these names, however, had been previously used for domestic races of sheep so that Hollister, in 1919, replaced Peters's name by *Ovis comosa*. Meanwhile, in 1913, Nasonov had described as *Ovis kozlovi* the sheep of southern Gobi (type from Yabarai Mts.) and in his 1923 monograph made this a race of *O. ammon*. He likewise regarded as distinct races the sheep of the Khur-khu Mountains, central Gobi, named *O. darvini* by Przewalski in 1884, and the sheep of the Sailüghem and Kobdo River basin of western Mongolia, which he named *O. przewalskii*. This last, however, Sushkin (1925), in reviewing his paper, regards as doubtless synonymous with *O. ammon*.

The series of over twenty sheep collected by the American Museum's expeditions includes five from Artsa Bogdo, at no great distance from the type-locality of *darvini*, and nine from Kweihuacheng, Shansi, as well as a single one from Lao Tsa Tao, Chihli Province, one hundred miles north of Peking, and another from the Tai Pei Shan, Tsingling Mountains, Shensi, the last apparently a new locality for sheep in China. I have carefully compared this series and can find no differences that would possibly be of value in distinguishing the sheep from these various localities, so they must all be regarded as representing one race, for which the oldest available name is *darvini*. It may be said, however, that the specimen from the Tai Pei Shan has the belly broadly and sharply white as far forward as the middle of the chest, whereas all but one or two of the Kweihuacheng series are dull-bellied or grizzled forward of the inguinal region. A single summer skin from the Little Altai, near Turkuta Pass, is available for comparison and is taken to represent typical *O. ammon*. It is rather darker than summer skins from the Gobi, and quite without trace of the rump patch, the entire buttocks and the belly being dark yellowish brown, frosted with whitish. In summer skins of *O. a. darvini*, the pale area of the buttocks is not sharply marked off but grades insensibly into the yellowish brown of the haunches. There is possibly a slight darkening with age.

***Pseudois nayaur szechuanensis* Rothschild**

Pseudois nahoor szechuanensis ROTHSCHILD, 1922, Ann. Mag. Nat. Hist., (9) X, p. 231.

The bharal of northwestern China seems to differ from the typical form of the Tibetan frontier of Nepal in the browner rather than black-

ish-gray summer coat, and in the restriction of the lateral stripe to the middle of the flanks. The leg markings are similar in general to those of the ibex, but nearly black. The stripe on the foreleg is interrupted at the knee, and extends quite to the hoofs, with lateral branches to the dew-claws.

Lydekker, in 1913, suggested that the Chinese blue sheep would be found to differ from the Tibetan animal, and this has proved to be the case, for Rothschild nearly ten years later named it on the basis of a skull from Shensi and a mounted skin from Szechwan. Later, 1928, Howell also pointed out the racial differences, and bestowed upon the northern animal the name *P. nayaur cæsia*, type from near Archuen, Kansu, which becomes a synonym. The Asiatic Expeditions secured an adult pair and an immature female from the same region, which appear to bear out the points of distinction noted by these authors. The horns of the male form a lateral curve; those of the female are smaller and nearly erect.

***Capra sibirica sibirica* Meyer**

Capra sibirica MEYER, 1794, Zool. Annalen, I, p. 397.

The type-locality of *Capra sibirica*, based on Pallas's description, is the Sayansk Mountains, west of Lake Baikal. A series of eighteen ibex skins in summer pelage collected by Dr. Andrews at Artsa Bogdo, in the central Gobi region, is regarded as representing this animal, which, like the argali, has penetrated the central part of the Gobi by following the mountainous country probably from the northwest. Adult males are yellowish brown above, fading on the sides to pale ochraceous, and to buff on the chest, and white on the belly. A narrow black line extends from the occiput nearly to the base of the tail, the tip of which is blackish brown; an area in front of the eyes extending transversely across the bridge of the muzzle is more or less dark brown like the beard; while the entire front of the neck and center of the chest may be more or less ticked with blackish brown; there is a dark stripe of blackish brown down the entire front side of the legs from the upper arm and the groin to the hoofs. In younger animals, the blackish ticking is absent, the black dorsal stripe often so, and the dark foot stripe is commonly interrupted just above the knee (or the hock), and again above the inner dew-claw.

In recent years a number of races of this ibex have been described, but Lydekker in his 'Catalogue of Ungulate Mammals of the British Museum,' does not attempt to appraise these. It is quite probable that

the race described by Noack as *C. s. hagenbecki*, from Kobdo, in the western Gobi, is inseparable from the animal I here refer to typical *C. sibirica*. The former is based on five skins in late winter pelage from "Ektag bei Kobdo," which are said to differ in color from three others from near Bjelucha in the central Altai to the westward, regarded as typical *sibirica*, though taken even farther from the type-locality. It seems very questionable if there can be as many well-marked local races as supposed.

In the series from Artsa Bogdo, it is evident that the males become darker with age, especially on the throat and chest. In the summer pelage there is no distinct saddle-patch as described by Lydekker, but the coloring grades by insensible degrees from the dark brown of the median area to the more ochraceous sides, paler flanks and whitish belly. The longer winter pelage is evidently very much more whitish as described and figured in color by Lorenz (Denkschr. Akad. Wiss. Wien, 1906, LXXX, p. 83, Pls. I-II). The slightly larger size and longer beard, as compared with the ibex of the European Alps, seem to be differences of degree rather than of kind, so that possibly the Asiatic animal may eventually be regarded as a subspecies of it.

***Capricornis sumatraensis argyrophætes* Heude**

Capricornis argyrophætes HEUDE, 1888, Mém. Hist. Nat. de l'Emp. Chinois, II, p. 4, footnote.

Characterized by its goat-like form, with horns curving backward. Color blackish brown, the feet rufous, usually with a line of blackish from below the knee to the hoof; hind foot usually clear rufous without dark line in front; white throat patch usually well developed, lips and a line from angle of mouth backward, white; sides of muzzle dark brown; mane more or less whitish.

The type-locality is the mountains of Chekiang, hence four specimens in the collection from Tunglu and Mokanshan of that province may be taken as typical. I can find no differences of moment that would distinguish these from a series of skins and skulls from Fukien and eastern Szechwan, but in their duller, browner coat, the lack of a contrasting patch of tan on the sides of the muzzle, and in the usual presence of considerable whitish in the mane, they seem to differ from skins of the western Szechwan animal representing *milne-edwardsi*, though the skulls of the two do not show appreciable characters that would separate them. One of the Chekiang skins has the body, legs, and feet deep black throughout.

Capricornis sumatraensis milne-edwardsii David

Capricornis milne-edwardsii DAVID, 1869, Nouv. Arch. Mus. d'Hist. Nat., Paris, V, Bull., p. 10.

Characterized by the slightly more intense coloring, deep black of the body, usual lack of much white in the mane, and the presence of a tan-colored spot on either side of the muzzle.

This was the first race of the serow to be described from China. It was collected in Moupin, a part of central Szechwan, by Père David, who briefly diagnosed it, and it was later more fully described and figured by Milne-Edwards. Though it is apparently not very different from the later-described white-maned *C. argyrochætes* of eastern China, it seems to be more intensely colored, with a bright-tan nose spot and a dark mane. The skulls of the two, when a sufficient series is examined, present the same variations. Some have narrow nasals, squarely truncate behind, and others have them very much broader and in contact not only with the entire dorsal edge of the maxillary but with the dorsal process of the premaxillary as well. Lydekker regards specimens from Yunnan and Burma as representing the same form, and mentions skins in the British Museum from Si-ho Valley, western Szechwan, and from north of Moulmein, Burma. After careful examination of the type specimen, I am convinced that *C. osborni* Andrews, from near Teng-yueh, Yunnan, must be regarded as a synonym.

Père Heude has given names to a number of specimens, chiefly from Moupin, showing slight variations in tooth structure or in the proportionate size of the nasals, but, for those who do not share his concept of a species, these names must be regarded as synonyms of *milne-edwardsii*, originally described from the same area.

Capricornis sumatraensis montinus, new subspecies

TYPE.—Adult male, skin and skull, No. 43039, American Museum of Natural History, from the Lichiang Range, Snow Mountain, Yunnan Province, November 5, 1916. Roy C. Andrews, collector.

DESCRIPTION.—Similar to *C. s. milne-edwardsii* but with feet whitish or rufous, usually without a black median line; skull characterized by the shallowness of the notches at the rear edge of the palate and by the greater width and more flaring shape of the posterior narial opening.

Color blackish brown, the body hairs in general pale or whitish basally, becoming blackish in the terminal half. Side of muzzle with a poorly defined patch of dull ochraceous just back of the tip; lips white with a white line extending back some four inches from corner of mouth, and separated by a narrow blackish area from the white throat patch that extends forward between the rami of the jaws; backs of ears and area about their bases more or less tawny, mixed with darker which predominates on

the terminal third of the ears; inside of ears white. The long hairs forming the central part of the mane are chiefly whitish becoming brown at their tips. Both fore and hind feet may be whitish with a slight admixture of pale rusty, more intense in some specimens. In the type the fore feet are bright clear ferruginous, the hind feet with an indication of the blackish stripe; again the dark central line may be practically obsolete. Along the sides and especially about the buttocks there is more or less mixture of rusty hairs; the belly and inguinal region are whitish.

SKULL.—The distinctive features of the skull in comparison with the two races previously mentioned are: (1) the wider, more flaring walls of the posterior narial opening correlated perhaps with the high altitude at which the animal lives; (2) the much shallower lateral notches of the posterior border of the palate, so that if a straight edge be laid across the hinder border of the last upper molars the palatal notches do not extend anterior to it, whereas in the two other races they extend forward to the level of the middle of the last tooth.

MEASUREMENTS.—The field measurements of the type are recorded as: total length, 1620 mm.; tail, 80 mm.; hind foot, 400; ear, 190. The skull measures: condylobasal length, 295 mm.; basal length, 279; palatal length, 172; length of nasals, 98; combined width of same, 51; zygomatic width, 129; mastoid width, 91; width across upper molars, 87; width of posterior nares, 44; upper cheek teeth, 84; lower cheek teeth, 98.

Isolated on the great snow peaks of the Lichiang range, the serow of this area appears to have developed distinguishing peculiarities of the palate and posterior narial region correlated perhaps with the need of a wider air passage for breathing in the rarefied atmosphere at altitudes of 10,000 feet and over in its alpine habitat. The nearly white feet distinguish some skins at hand from those of the two races previously mentioned, but, as already noticed by Andrews, this color may vary to bright rusty, and in one skin there is a short black stripe on the front. A vivid account of hunting serows in this mountain region has been published by Dr. Andrews.

***Næmorrhædus goral caudatus* (Milne-Edwards)**

Antelope caudata A. MILNE-EDWARDS, 1867, Ann. des Sci. Nat., Zool., (5) VII, p. 377.

There can be no doubt that the gorals of China and northeastern India (Sikhim and Nepal) comprise but a single species characterized by its goat-like form, short conical horns more or less in the plane of the face, the absence of lacrymal pits, and the shaggy gray coat with pale throat. There is great individual variation in the amount of brown mixed with the gray, in the tint and extent of the pale throat patch, and in the amount of gray hair at the base of the tail, as well as in the intensity of the ochraceous tint of the feet, factors which render difficult the satisfactory definition of geographic races. No less than eighteen

"species" have been recognized by Heude in China alone, while Pocock regards the brown and the gray forms of Nepal as distinct. He also concludes that the animal found in parts of western China is indistinguishable from that of Amurland named *raddeanus* by Heude. Finally, J. E. Gray, in 1862, named the Formosa goral *swinhoii*. Lydekker, in his 'Catalogue of the Ungulate Mammals of the British Museum,' 1913, has followed Pocock in recognizing five "species."

The oldest name given to the group is *Antilope goral* of Hardwicke, 1825, which, as Pocock has shown, applies to the gray Himalayan animal. The first name given to any Chinese goral is *A. caudata*, of Milne-Edwards; type-locality, the mountains north of Peking. The same author, in 1871, characterized as new, *Nemorhedus griseus* of Moupin, Szechwan, and three years later *A. cinerea*, a somewhat grayer animal, from the same general region. In 1894, Heude gave names to no less than fourteen Chinese forms which, according to his concept of species, he regarded as new. One of these names, *Kemas henryanus*, had previously been quoted in print by Henry who, apparently, since he mentioned the size of the animal, must stand as its author. The relationship of *swinhoii* of Formosa must be very close to the continental goral.

The collections of the Asiatic Expeditions include over thirty skins from North China and Yunnan, which with a series of seven from Hupeh and Szechwan in the Museum of Comparative Zoölogy have formed the basis of a careful study. This material seems to include but three recognizable forms: (1) that of North China which averages slightly paler, with a longer under-wool in the winter pelage, and with the gray of the back extending well on to the base of the tail; (2) that of the western highlands, Szechwan and Yunnan, of shorter coat, and slightly darker pelage; and (3) the animal of southeastern China, with darker neck and a smaller but brighter-orange throat patch. The collections contain three skins from Tungling, Chihli Province, that are virtual topotypes of *caudatus*, and two others in fresh, winter pelage from Kwei-huacheng, Shansi Province, that are indistinguishable. Two of the Tungling skins illustrate the extremes of color variation, the one a uniform pale buffy gray on the body only slightly darkened by the short blackish tips to the guard hairs, the other much darker and browner in general appearance due to the more abundant dark brown over-hairs with longer brown tips. The woolly under-hairs are gray and nearly as long as the guard hairs. In the grayer specimen the front of the fore and hind feet is nearly whitish slightly washed with buffy, but in the browner animal these parts are almost ferruginous. In the former the

forehead, chin, and lower throat are grizzled like the back, but in the latter these areas are dark brown. Both have the usual dark spinal stripe. The four other skins from Chihli and Shansi more nearly resemble the grayer individual. Milne-Edwards believed the tail was longer than in the Himalayan goral, but this character seems variable. The base of the tail, in unworn skins, is mixed gray like the back. The throat in all is nearly clear white narrowly bordered with pale ochraceous.

***Næmorhedus goral griseus* (Milne-Edwards)**

Nemorhedus griseus MILNE-EDWARDS, 1871, Nouv. Arch. Mus. d'Hist. Nat. Paris, VII, Bull., p. 93. Moupin.

The goral of the western Chinese highlands is very little different from *caudatus* of North China. The main external characters are the slightly shorter coat in winter, with shorter under fur, and the somewhat darker, less gray color. But these differences are average ones only. In the specimens at hand, including some twenty skins from Teng-yueh and the Lichiang Range, Yunnan, the throat patch is uniformly whitish with narrow, pale-ochraceous border and extends nearly to the lips; the chin is dusky, the flanks and belly pale buffy gray. The base of the tail is usually dark brown instead of being gray like the back. The length of the tail as measured in the flesh varies from 130–150 mm., and does not differ in this respect from that of *caudatus*, which Milne-Edwards believed was longer. The chief differences observable in the skull are the slightly smaller tooth rows and shorter, finer muzzle as compared with the latter. Indeed, the two animals are so nearly alike that Lydekker refers a skin from Szechwan to *caudatus* and three others from "western China" to *raddeanus* of Amurland.

***Næmorhedus goral henryanus* (Henry)**

Kemas henryanus HENRY, Proc. Zool. Soc. London, 1890, p. 93; HEUDE, Mém. Hist. Nat. de l'Emp. Chinois, II, p. 244. Ichang gorges.

A series of six skins and skulls from Hupeh Province, in the Museum of Comparative Zoölogy, indicates that the goral of southeastern China is a recognizable race, to which the name *henryanus* is applicable. The dark brown tone of the body extends to the sides, belly, chin and lower throat, where it encroaches considerably on the throat patch as compared with *griseus* and *caudatus*. The throat itself in all the Hupeh specimens examined is uniformly pale orange instead of whitish with ochraceous border, and Heude states that a similar condition is found in the specimens from Chekiang which he named *arnouxianus*. No doubt there is

some degree of variation in the color, for Heude describes his specimen of *henryanus* as having the throat patch white, "bien bordé de jaune," but at the same time names other specimens also from the Ichang gorges, characterized by having the throat patch "moins étendu, mais plus brillant," which seems to be in general true of animals of this part of China. His *K. aldridgeanus* and *K. fantozatianus* are therefore synonyms of *henryanus*.

To this same race appears to belong an imperfect skin (lacking head and feet) secured by the Third Asiatic Expedition at Yenping, Fukien Province. It is in winter pelage (late March), of a rich dark shade, due to the abundance of blackish-tipped hairs over the body. Only a portion of the throat patch is present, but this, though bordered with deep ochraceous, is whiter in the center than in most of the skins from Hupeh. The knees and hocks show the beginning of a deep ochraceous area on the feet. In its darker color and richer ochraceous tones it agrees with *henryanus* rather than with *griseus*. This is the first record I have found for the goral in southeastern China.

***Budorcas taxicolor bedfordi* Thomas**

Budorcas bedfordi THOMAS, 1911, Abstr. Proc. Zoöl. Soc. London, p. 27.

The takin of Tai Pei Shan, Shensi Province, represents the extreme of the paling out of color seen already in *B. t. tibetanus* of Szechwan. The collections of the Asiatic Expeditions include four adult females and an immature animal, all from the type-locality. The former agree in being nearly uniform white with a faint golden tint, most pronounced on the neck and chest, while on the metapodial region and especially on the tail it deepens to rusty. The muzzle may retain a few black hairs and a few longer ones are present just below the eye. In *B. t. tibetanus* the muzzle is blackish and there is a well-defined though irregularly broken eye-ring of blackish, while the flanks retain more or less of darker color, and a black median line runs down the back. It is interesting that a single immature female, also from Tai Pei Shan still retains the dark muzzle and backs of the ears as well as a dark dorsal stripe, but it lacks a definite ring about the eye, while the flanks are only slightly gray, the legs mixed gray or blackish and white. It therefore is nearly like the adult of *tibetanus*, but with slightly less of the darker areas. The only available skull of the latter race is hardly different from that of *bedfordi*, except that the premaxillaries, instead of tapering evenly to the end of the muzzle, bow out slightly in their middle, a character that may be merely individual, but is seen also in Lydekker's published figure of the skull.

***Procapra gutturosa gutturosa* (Pallas)**

Antilope gutturosa PALLAS, 'Spic. Zool.,' 1777, part 12, p. 46, Pl. II.

A gazelle, general color above bright ochraceous buff in summer, paling on flanks, cheeks, and haunches to pinkish cinnamon; muzzle above brown; legs ochraceous buff in front becoming brownish on lower half or third; chin and upper throat, belly and inside of limbs white extending up on the buttocks on either side of the base of the tail, to cut off a narrow median line continuous with the brown of the very short stumpy tail.

A series of nearly thirty specimens, old and young, was secured by the Asiatic Expeditions in the Gobi Desert, to the southeast of Urga. Nearly all are adult females, some of which in late June and early July were with young newly born or nearly ready for birth. Perhaps the males herd apart at this season. The skulls of these antelopes are very different from those of the genus *Gazella*, extremely light and thin of bone, long and slender, with pointed tapering nasals, inflated muzzles, and slightly developed lacrymal depression. The audital bullæ are relatively smaller. Externally these antelopes lack the large glandular opening in front of the eye, are without the facial stripes of *Gazella*, and have no tufts of long stiff hairs on the knees. There is no doubt that they are to be distinguished generically from *Gazella*.

There is a certain amount of variation shown in the shape of the terminal lobe of the last lower molar. In some it is very narrow, with its long axis in line with that of the inner cusps, but in others and especially with age and wear it becomes wider transversely and its axis slightly deflected outward. It was mainly on the basis of this outward deflection of the terminal lobe that Hollister described *P. altaica*, from northwestern Mongolia, but it is likely that this will prove to be merely an individual variation, while the supposed larger molars of this animal are not different in dimensions from those of adults in the present series.

***Gazella subgutturosa hillieriana* Heude**

Gazella hillieriana HEUDE, 1894, Mém. Hist. Nat. de l'Emp. Chinois, II, p. 245, Pl. xxxvi.

Males with lyrate horns, slightly but definitely turned in at the tips, suborbital glands and knee tufts present. General color above, sandy, about "pinkish cinnamon," deepening in tint along the flanks and across the rump to form a darker band bordering the pure white of belly and buttocks. The color of the back passes down the outer side of legs, and is continuous medially as a narrow strip to the base of the tail, dividing

the white of the posterior side of the hind-quarters. Tail dark blackish brown, mixed with ochraceous-tipped hairs basally. Muzzle white, the forehead nearly so; the dark facial streaks from the eye forward usually obsolete. Chin and throat white, continuous with the white of the ventral surface.

As a species, this gazelle has an exceedingly wide distribution from the Persian Gulf, north and east into the Gobi Desert. The type-locality of *subgutturosa* is Persia, "probably the Bussora district" (Lydekker and Blaine), but in eastern Turkestan a slightly larger form, *G. s. yarkandensis*, in which the facial stripes are said to be more clearly defined, intervenes, eastward of which the pale, white-faced animal is found. To the Mongolian gazelle Heude has applied two names, *hillieriana* and *mongolica*, both currently regarded as synonyms of *subgutturosa*. Heude mentions no definite localities and makes no comparison of his specimens with the western races, while the points of distinction between his two described forms are said to lie chiefly in minute differences in the curvature of the horns. His two plates, showing a skull and teeth of each, are obviously much alike and the supposed distinctions between the two animals are doubtless merely matters of individual variation. Nevertheless, it is quite likely that if comparison could be made between specimens from Persia and from the Gobi, differences would be apparent, so that until the two are proved to be really identical, it seems better to use the first of Heude's names for the Mongolian gazelle of the central Gobi Desert in a subspecific sense. Judging from the colored plate in Sclater and Thomas's work on the antelopes, the Mongolian form is much more cinnamon, with paler limbs, and possibly with a shorter tail. Crania of the typical Persian race are not available for comparison. A large series of skins and skulls was secured by the Asiatic Expeditions at Tsagan Nor, as well as at Loh and between Kalgan and Loh.

